MONTHLY WEATHER REVIEW,

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WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTORY.

The Monthly Weather Review for October expresses the mean meteorological conditions as determined by observations made at 448 stations. These stations are thus classified:

United States Army Signal Service	91
Canadian Meteorological Service	9
United States Army Surgeons	60
United States Naval Hospitals	1
Volunteer Observers	287

Their collective observations have been supplemented by extracts from the press reports, and other memoranda.

Only one very dangerous storm has been recorded. The general aspects of the October weather have been dryness and calmness, the usual haziness and moderate barometric contrasts; while frosts, abundant at the close of the month, and the first snows of winter fell over the Northwest and the Lake region. The forest fires in the central States were encouraged by the prolonged rainless season. The thermometric range was considerable and several times sudden. The nocturnal radiation of the earth (large because of the dryness of the air) was manifested by high nocturnal humidity.

ATMOSPHERIC PRESSURE.

(1.) The general distribution of pressure is exhibited by the isobarometric lines (in black) on Map No. II. The high pressure areas moving over the country appear less clearly defined than usual for October.

(2.) *Areas of low barometer.*—There have been nine distinguishable depressions moving across the country, or near its frontiers, whose disturbing effects have been felt. The tracks of each of these, chronologically numbered, appear in black lines on Map No I. and the details of each storm are herewith appended. The most severe of these storms have

passed over the Lake region. The progress of some has been obviously much retarded by the presence of very high pressures, lying athwart their normal paths. There have been but one or two of these storms of marked cyclonic violence, their character partaking, generally, more of that of summer disturbances than of equinoctial storms.

Storm No. I first came in sight in Minnesota, on the 1st of October, and moved nearly due east towards Nova Scotia. It was attended, in its passage over the Lakes, by high but not very dangerous winds, its advance having been at the nearly uniform velocity of twenty-one miles an hour.

No. II is first recognizable on the weather maps of the 3d of October, when it was slowly moving from western Nebraska due north, towards the upper Missouri river. Crossing the Missouri in Dakota, and relieved from the presence of an area of high pressure in its front, (by which it had been deflected and detained,) it curved quite sharply to the eastward, and, after passing Lake Superior, took a southeastward course to Lake Erie. This movement was performed very leisurely, taking from the morning of the 3d to the midnight of the 6th. On reaching Lake Erie, it lay in a barometric trough, between two high pressure areas; and the depression seems to have been then filled up, or to have disappeared from the map. If again distinguishable, it is only as an ill-defined area, lingering in the upper Ohio valley, until it mingles with No. III, which, as will be seen from the map, was, meanwhile, working its way from the south towards the same valley. The precipitation of this feeble depression did not serve to allay the autumnal drought in Ohio, and its accompanying winds were not serious on the Lakes.

No. III. This storm, originating in the southwest, progressed in a nearly due northeastward direction, along the Appalachian chain, toward the lower St. Lawrence valley, with some rapidity, but with no very notable circumstances.

No. IV was traced from Minnesota (on the morning of the 8th) in a line running north of the Lakes and nearly due eastward to the lower valley of the St. Lawrence. Its effects were most decidedly felt on Lake Huron, but not in dangerous winds. The rains accompanying it, as those of its predecessors, were generally very light.

No. V. This storm's track was peculiar, and quite meandering. It was first visible on the 13th in northern Dakota, whence it moved in an eastward course to western Minnesota. Thence, on the 14th, directly south, trending slightly to southwest, on the 15th, until it arrived in southeastern Kansas. It then moved in a northeastward direction, crossing the Mississippi river a little below St. Louis, whence it struck off in a southeastward line across Kentucky and East Tennessee, and thence to the coast of South Carolina. From the vicinity of Charleston, its path lies, so far as anemometric indications afford light, along the warm-water current of the Atlantic toward Newfoundland, evidencing its northward progress by the Atlantic coast winds and other signs, as it passed south of Halifax, N. S. It consumed four entire days from Dakota to South Carolina, moving with constantly varying velocity. Its velocity on the ocean cannot be accurately determined. The storm was accompanied, while in Tennessee, with heavy rains; but elsewhere with no remarkable rain-fall.

No. VI. This was, also, originally a northwest storm-centre, and, commencing in Dakota on the 26th, moved in a nearly due east-northeast course to the mouth of the

St. Lawrence river, traversing this distance in forty-eight hours, with a nearly uniform speed of thirty-four miles an hour. Light winds and light precipitation attended its entire course.

No. VII was but a feeble and ill-defined depression, crossing only the northwestern angle of the Lake region. It entered the field of observation in western Dakota on the night of the 18th, and passed beyond sight, north of Lake Huron, on the night of the 20th, thus moving slowly. But little rain-fall attended it, and no violent cyclonic phenomena.

No. VIII, like No. V, was erratic in its course and behavior. First seen moving eastwardly in western Kansas, on the 20th, its pathway was straight to Leavenworth, which it reached by very deliberate advances, averaging five miles an hour. At Leavenworth it recurved sharply to the northwest, and pursued this unusual course, ascending the Missouri valley to northern Dakota. Then, on the 24th, it moved nearly due east, and, on arriving in northern Minnesota, took a southeast direction towards St. Paul. Thence it passed northeastwardly on the 26th to northern Lake Superior, and from this region, directed its way nearly due east to Nova Scotia, attaining the Atlantic coast on the night of the 28th, having occupied eight days in the circuitous transit. Feeble and obscure at first, it was characterized by high southerly winds in the Northwest; but, while traversing the Lake region, its winds subsided, and its precipitation was gentle. It marks the transition from summer-like depressions to those of a more decided winter-type.

No. IX. This storm was one of great severity, marked by a nearly straight track and rapid progressive motion, as well as by very high cyclonic winds. Coming into notice in Nebraska, on the afternoon of the 27th, it coursed with accelerating speed to the northeastward, and on the afternoon of the 28th had made five hundred and fifty miles in twenty-four hours. It was now central in southern Minnesota, and preceded by very high and dangerous winds on the Upper Lakes. Its line of progression was over southeastern Lake Superior, and thence northeastwardly north of the St. Lawrence valley towards Labrador. In its passage of the Lakes it was attended with considerable rain-fall, turning to snow, with the rapid decline of temperature that followed in its wake. The severity of this storm was first betokened on the morning of the 28th, by the remarkable northerly deflection of the isotherms in the Mississippi valley. This deflection was more conspicuous in the afternoon and night of that day. There were numerous disasters resulting from the high gales attending this storm-centre on the Upper Lakes. A Milwaukee paper of the 30th contains the following dispatch from Grand Haven: "As forewarned by the Signal Service storm-danger signal yesterday forenoon, a heavy wind-storm from the south, accompanied at intervals with light rain and vivid lightning, reached here last evening and continued until mid-day of to-day." A Detroit paper of same date states: "Soon after midnight Wednesday, the gale which the signal corps predicted a day and a half in advance, blew up from the west." It adds: "The gale increased in violence until noon;" and "on land it moved everything not fastened."

During the progress of the storm at Duluth, the following observations were made:

	Barometer.	Thermometer.	Humidity.	Wind. Direction.	Wind. Velocity.	Rain.
6:35 A. M.....	29.77	45	84	NE	30	Heavy.
7 "	29.75	45	84	NE	32	Heavy.
8 "	29.75	46	84	NE	36	Light.
9 "	29.68	46	84	NE	36	Light.
10 "	29.63	46	92	NE	36	Heavy.
11 "	29.61	45	92	NE	36	Light.
12 "	29.53	46	84	NE	36	Light.
1 P. M.....	29.47	46	92	NE	40	Light.
2 "	29.42	46	92	NE	48	Light.
3 "	29.48	46	92	NE	40	Heavy.
3:35 "	29.43	46	92	NE	40	Light.
5 "	29.42	46	92	NE	40	Light.
6 "	29.40	45	84	NE	36	Light.
7 "	29.39	44	92	NE	28	Light.
8 "	29.35	45	84	NE	26	Light.
9 "	29.35	44	92	NE	24	Light.
10 "	29.34	43	92	NE	24	Light.
11 "	29.32	43	92	NE	28	Light.
Midnight.....	29.31	43	91	NE	27	Light.

The sea on Lake Superior was very violent, and the rocks, on the outside of the Duluth breakwater, were thrown on the inside by the waves. Several vessels coming toward this port, from the north shore of the Lake, were disabled, and one lost.

(3.) *Areas of high barometer.*—The following sketches briefly indicate the tracks of the six most important barometrical maxima for October. These tracks, owing to the extent of the areas of baric maxima, cannot be so precisely delineated as those of baric minima. But they can be given approximately; their general course is from the Northwest towards the south Atlantic coast. Their tracks, it will be seen, cross the storm-tracks nearly at right angles, and their general progressive motion is contrary.

No. I. The first of these areas of high barometer entered the United States from the region north of Lake Superior, on the 3d ult., and moved in a due southeast course towards Pennsylvania and Virginia, passing off the Atlantic coast on the 5th. The highest barometers connected with it were about 30.50 inches.

No. II was an area of less decided character, introducing itself from the Red River valley of the North and pursuing a path parallel with that of No. I, to the southern shore of Lake Michigan, where it became unimportant, and was partly absorbed by depression No. II, referred to under the head of *Areas of low barometer.*

No. III. This area of high pressure also originated in the Northwest or north of Dakota, on the 10th, and moved southeastwardly to Tennessee, whence its apparent track was a little to the north of east, while, on the 16th, it disappeared off the Virginia and Carolina coasts. It was quite well-defined and attended by but little precipitation. As this area of high pressure reached the South Atlantic seaboard, it produced high northeast winds along the coast. On the 13th, the German bark Netherland, from Rotterdam, when approaching Tybee Island, ran on the shoals which make out from the northeastern extremity of the Island, and though her crew and much of her cargo were saved, she subsequently went to pieces.

No. IV. This, like its predecessors, originated also in the Northwest, crossing Lake Superior on the 20th, and advancing southeastwardly, reached New Jersey on the 23d. Meanwhile, another high pressure.

No. V, was approaching the Middle States from the Province of Quebec. This latter area took a peculiar course; first, southeast, from Quebec to Nova Scotia; second, from Nova Scotia, in a nearly southwest direction, across the Middle Atlantic States and Tennessee to Mississippi and Louisiana; thence a due eastward path towards southern Georgia, making the entire tour at a nearly uniform rate of progress, in six days, (*i. e.*, from 22d to the 28th.) The pressures were highest in Canada, and, as the area moved southward, they gradually decreased, until they became imperceptible off the Florida coast on the 28th. The high pressure was felt on the Atlantic coast in long continued northeasterly winds and in the heavy swell of the ocean.

No. VI followed, the severest of all the October storms, (that marked IX,) and ushered in the extensive rain-areas and snow-areas in the Northwest and Lake region, and also the low temperatures and heavy frosts, which finally extended to the Gulf of Mexico. The pressures were very high in this anti-cyclone, and the winds accompanying it were also high in the Lake region. Its line of progression was from the Northwest to the lower Mississippi valley Its effects were felt after the month of October closed, although it was quickly succeeded in the Northwest by falling barometer. The frosts which followed it, however, extended over the whole country east of the Rocky Mountains and to the neighborhood of Mobile and Pensacola, Florida.

ATMOSPHERIC TEMPERATURE.

The thermal changes of October, with one or two exceptions, were neither severe nor sudden. The southward deflection of the low thermometer isotherms commenced in the Northwest and Upper Lake region, and proceeded first down the Missouri and Mississippi valleys, and thence eastwardly over the Appalachian Belt and the Atlantic States. The extreme ranges of temperature were at Bismarck, D. T., from 83° to 6°; at Breckenridge, from 76° to 10°; at Cheyenne, from 80° to 11°; at Colorado Springs, from 76° to 20°; at Fort Gibson, I. T., from 87° to 24°; at Indianapolis, from 78° to 28°; at Knoxville, from 80° to 30°; at Leavenworth, from 89° to 21°; at Omaha, from 78° to 18°; at North Platte, from 82° to 14°; at St. Louis, 83° to 30°.

The temperature was everywhere, except in the South Atlantic States, above the normal or usual height. (See Table Map No. II.)

PRECIPITATION.

This item is graphically represented on Map No. III; the table printed thereon shows the areas of deficiency or excess, as compared with the normal precipitation, deduced from the observations of other years. The map shows a general deficiency over the entire country. The only excess, and that very small, is over the Upper Lakes.

RELATIVE HUMIDITY.

The connection between this condition and the precipitation, will be seen by comparing the rain-chart data with the following means of humidity: New England, 72.6; Middle States, 68.1; South Atlantic States, 70.2; Eastern Gulf States, 71.0; Western Gulf States, 66.0; Lower Lakes, 69.00; Upper Lakes, 74.1; Ohio valley and Tennessee, 64.1; Lower Missouri valley, 63; Upper Mississippi valley, 67, and Minnesota, 70.7.